

REVISION OF *AROCERA* SPINOLA
(HEMIPTERA: PENTATOMIDAE)

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Abstract.—The neotropical genus *Arocera* Spinola is revised and two keys are provided to species, one based on color the other on the male genitalia. Two new species are described, *A. colombiana* from Venezuela and Colombia and *A. verdana* from Panama and Costa Rica. The following new synonymies are recognized: *A. spectabilis* (= *A. apta* Walker, = *A. jalapensis* Distant, = *A. patibula* Distant, = *A. melanopygai* Stal, = *A. crucigera* Haglund); *A. nigrorubra* (= *A. affinis* Distant, = *A. altivola* Distant, = *A. chiriquensis* Distant, = *A. contralineata* Piran, = *A. placens* Walker, = *A. protea* Distant); *A. elongata* (= *A. repleta* Van Duzee).

Arocera Spinola occurs in Central and South America, with one species extending into the Caribbean Islands. There is a great deal of synonymy in this genus due to the fact that many color variants were described as species. The genus is fairly closely related to *Runibia* Stal, the male genitalia of both genera being similar. However, in *Runibia* the osteolar sulcus is plate-like extending less than half the distance between the osteole and the margin of the pleuron, in *Arocera* the sulcus extends for two thirds this distance and is narrow and curved cephalad. The first rostral segment extends well past the bucculae in *Runibia*, whereas the first rostral segment is almost the same length as the bucculae in *Arocera*. Nothing, unfortunately has been published so far on the biology of this species. Rolston (1976) verified the generic assignment of some species of *Arocera*. Distribution records indicate countries only, in the case of larger countries, federal states are cited where possible to indicate smaller geographic regions. Froeschner (1981:68) gives a number of additional distribution records for several species of *Arocera* in Ecuador.

Arocera Spinola, 1837

Arocera Spinola, 1837:316; Stal, 1867:529; Stal, 1872:37; Lethierry and Severin, 1893:158; Kirkaldy, 1909:109.

Oedosoma Amyot and Serville, 1843:128. (Synonymized by Kirkaldy, 1909.)
Estphoria Gistel, 1848:VIII. (Synonymized by Kirkaldy, 1909.)

Type. Arocera aroleuca (Perty, 1833). Type not located.

Diagnosis. Brightly colored bugs patterned in a combination of yellow, orange or red and black or brown, or mostly metallic green or brown. HEAD: Tylus and jugae of equal length; jugae with margins raised at least at apex, in some species entire margin raised, with diagonal striae. Antennae with segment 3 flattened, sometimes grooved, flattening not very apparent in *A. spectabilis*; some species also with either 2 flattened, or 4 flattened or both 2 and 4 flattened. Rostrum extending to hind coxae or well beyond in *A. elongata*, first rostral segment projecting slightly beyond buc-

culae. THORAX: Prothorax with a small spine on each anterior angle. Osteolar peritreme elongate, curved cephalad, and extending for $\frac{2}{3}$ distance between osteole and plural margin; evaporative area extensive, extending onto mesopleuron. ABDOMEN: Connexiva covered by hemelytra.

Male genitalia. Pygophore with small rounded tubercles or large horns covered with spicules on margin. Claspers, simple L or T shaped with a small thumb-like process in *A. rufolimbata*, *A. verdana*, *A. colombiana*, *A. rufonotata* and *A. splendens*. Theca small, simple with well developed basal plates. Conjunctival appendages bi- or tri-lobed apically, sclerotized to varying degrees; median penial lobes rod-like or flattened disc-like structures fused basally; ejaculatory duct short, not protecting beyond conjunctival lobes.

Female genitalia. External genitalia typically pentatomoid, dorsal surface of 8th paratergites deeply concave in *A. splendens*, *A. rufonotata*, *A. colombiana*, n. sp., *A. verdana*, n. sp., and *A. rufolimbata*, in the remaining species dorsal surface flat. Spermatheca with well developed reservoir and pump; bulb of pump with an elongate appendage in *A. nigrorubra*, *A. spectabilis*, and *A. elongata*, in the remaining species bulb without appendages. Ring sclerites and accessory sclerites present in vulva around spermathecal entrance.

KEY TO THE SPECIES OF *Arocera* SPINOLA

1. Dorsal surface* largely metallic green (sometimes blue), shades of metallic green or dull brown, reddish brown, or brownish green 2
- Dorsal surface colored in patterns of black or brown or yellow, orange or red 6
- 2(1). Dorsal surface metallic green (sometimes blue), with a narrow red band around anterior margin of pronotum; or dorsal surface duller green or brown with abdominal connexiva checked black and red 3
- Dorsal surface dull red-brown or green-brown with narrow yellow or red band around anterior margin of pronotum; abdominal connexiva unicolorous 5
- 3(2). Dorsal surface uniformly metallic green or greenish brown *splendens* (Blanchard)
- Dorsal surface marked with red at least on scutellum 4
- 4(3). Scutellum with a brick red stripe centrally, outer margins of elytra with a brick-red stripe from inner angle *verdana* McDonald
- Pronotum with a red spot centrally; red maculae on scutellum and hemelytra *rufonotata* Stal
- 5(4). Dorsal surface cinnamomeus, margins of hemelytra and pronotum distinctly outlined to varying degrees with black *colombiana* McDonald
- Dorsal surface brunneus or brown-green, unicolorous *rufolimbata* Stal
- 6(1). Nota and hemelytra with 5 longitudinal stripes of alternating yellow and black; black stripes, uniting basally in membrane to form a horseshoe pattern, Fig. 9 *acroleuca* (Perty)
- Color pattern otherwise 7
- 7(6). Dorsal surface dark to pinkish red with oblong black or brownish maculae on pronotum scutellum and hemelytra; antennal segments 2 + 3 usually distinctly flattened. If background color is yellow or orange, then maculae on pronotum, scutellum and hemelytra are a faded smoky brown *rufifrons* (Dallas)

* This term refers collectively to the pronotum, mesoscutellum and corium-clavus of the hemelytra.

- Species with yellow, brown or orange background, maculae on pronotum, scutellum and hemelytra distinctly black; color if red not patterned as above 8
- 8(7). Dorsum patterned in distinct square maculae of black on yellow or orange (Fig. 1); first antennal segment yellow; species usually larger than 11.0 mm long, 6.2 mm wide (male) and 11.3 mm long and 6.5 mm wide (female) *spectabilis* (Drury)
- Color pattern variable; first antennal segment black 9
- 9(8). Dorsal surface bright orange red or black with red spots, well over 14 mm long ..
..... *elongata* Showalter
- Dorsal surface with variable diffuse color patterns in brown or black with orange, red or yellow; species usually no larger than 11.8 mm long and 6.1 mm wide (male) or 11.1 mm long and 6.4 mm wide (female) *nigrorubra* (Dallas)

KEY TO THE SPECIES OF *Aroccera* BASED ON THE MALE GENITALIA

- 1. Dorsal margin without tubercles or plates. Claspers with a distinct finger-like process on stem (Fig. 47) 2
- Dorsal margin with tubercles or plates (Fig. 30). Claspers without finger-like process on stem 6
- 2(1). Ventral margin produced into two stout arms one on each side of the proctiger and an outer pair of plates, both structures covered in fine tubercles (Fig. 17) 3
- Ventral margin not so developed, lower plates absent 4
- 3(2). Claspers small triangular with a small process on stem (Fig. 20). Conjunctival appendages multi-lobed (Fig. 22) *splendens* (Blanchard)
- Claspers L-shaped, process longer and curved (Fig. 53). Conjunctival appendages bi-lobed (Fig. 54) *rufolimbata* Stal
- 4(2). Inferior ridge with small tubercles below the horn-like protuberances on either side of the proctiger (Figs. 45, 67) 5
- Inferior ridge without tubercles *colombiana*, new species
- 5(4). Tubercles on inferior ridge arranged in a triangular patch below horns (Fig. 45). Claspers distinctly L-shaped, apex blunt; process on stem elongate *rufonotata* Stal
- Tubercles on inferior ridge arranged in a more linear fashion below horns (Fig. 67). Claspers more triangulate with an acute apex, process small and stout (Fig. 47) ..
..... *verdana*, new species
- 6(1). Dorsal margin of pygophore with distinct plates fully visible; superior ridge not developed *acroleuca* (Perty)
- Dorsal margin with tubercles partly concealed beneath the margin; superior ridge or depression well developed (Fig. 2) 7
- 7(6). Dorsal margin of pygophore with a distinct depression above base of proctiger (Fig. 57). Claspers with a small tubercle on stem, apically blunt (Fig. 60)
..... *elongata* Showalter
- Dorsal margin of pygophore with a well developed superior ridge. Claspers without tubercle, often acute apically (Fig. 40) 8
- 8(7). Claspers tri-lobed (Fig. 4). Ventral margin of pygophore almost straight (Fig. 3) ..
..... *spectabilis* (Drury)
- Claspers otherwise. Ventral margin of pygophore either centrally concave or convex 9
- 9(8). Proctiger divided dorsally into two plates (Fig. 38). Apex of ejaculatory duct lying well below outer margins of median penial lobes (Fig. 42) *rufifrons* (Dallas)
- Proctiger not divided dorsally into two plates (Fig. 30). Apex of ejaculatory duct reaching outer margins of median penial lobes (Fig. 34) *nigrorubra* (Dallas)

Arocera spectabilis (Drury, 1782)

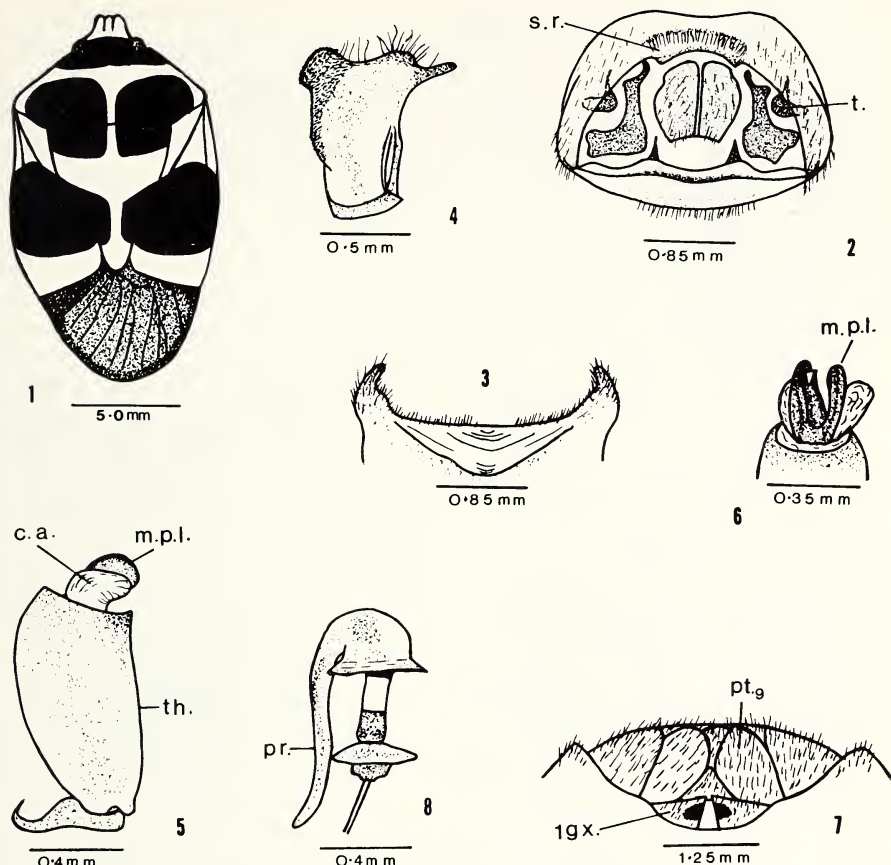
Figs. 1-8

Cimex spectabilis Drury, 1782:Index and p. 66, pl. 46.*Strachia spectabilis* Dallas, 1851:266.*Strachia generosa* Stal, 1854:233.*Arocera spectabilis* Stal, 1872:38; Kirkaldy, 1909:110; Grazia, 1977:163.*Arocera schumanni* Distant, 1890:336, pl. 31; Kirkaldy, 1909:110; Rolston, 1976:3.**New Synonymy.***Strachia melanopyga* Stal, 1858:437. **New Synonymy.***Strachia apta* Walker 1867:323. **New Synonymy.***Arocera melanopyga* Stal, 1862:107.*Arocera crucigera* Haglund, 1868:157. **New Synonymy.***Arocera apta* Distant, 1880:73, pl. 7; Kirkaldy, 1909:109; Piran, 1963:107; Becker and Grazia-Vieira, 1977:55.*Arocera jalapensis* Distant, 1890:337, pl. 30; Kirkaldy, 1909:109. **New Synonymy.***Arocera patibulata* Distant, 1880:74, pl. 7. **New Synonymy.**

Types. The type of *Cimex spectabilis* was not located. However, from Drury's description and figure this is clearly *A. spectabilis*. The types of *Strachia apta* Walker ♀; *Arocera jalapensis* Distant ♀; *Arocera schumanni* Distant ♂ and *Arocera patibulata* Distant ♀, all in the British Museum (Nat. Hist.) were examined. The type of *Strachia melanopyga* Stal, *A. crucigera* Haglund were examined, both types are in the Naturhistoriska Riksmuseet, Stockholm.

Diagnosis. HEAD: Dorsal surface black basally, yellow apically; ventral surface yellow. Eyes black. Antennae. First segment orange, remainder black; segments 2 and 3 slightly flattened. Rostrum surpassing mesocoxae, segments 1-3 orange, 4 black. THORAX: Pronotum yellow, with a black band between anterior angles and basally two oblong black patches separated by a mesial strip of yellow. Scutellum yellow with two oblong patches basally; confluent with those on the prothorax; two further oblong black patches about three quarters length of scutellum separated from basal patches by a band of yellow, apex yellow. Hemelytra yellow with two broad oblong black patches in middle of coria confluent with patches on the scutellum. Ventral surface orange, usually with large black spot in middle of each propleuron. Evaporative area extending from base of mesopleuron to metapleuron. Legs. Coxae, trochanters and proximal $\frac{1}{2}$, orange; femora orange; distal $\frac{1}{6}$ fuscous; tibiae and tarsi black. ABDOMEN: Connexiva orange; ventral surface orange and yellow.

Male genitalia. Pygophore with ventral margin smoothly and shallowly emarginate, a crescent shaped depression found beneath centre of margin on central surface of pygophore. Dorsal margin deeply arched with well defined superior ridge. A small pair of triangular tubercles found on lateral inner margin, one on each side. Proctiger oblong, box-like with unsclerotized mid-line. Numerous long fine setae found on margins of pygophore and on proctiger. Clasper apically expanded into 3 lobes, dorsal lobe finger-like, stem thick. A number of fine setae on outer surface of clasper. Aedeagus. Theca cylindrical and very heavily sclerotized, basal plates large oblong. Dorsal rim bearing a small membranous bi-lobed process. One pair of conjunctival appendages; small oblong membranous structures slightly sclerotized apically. Me-

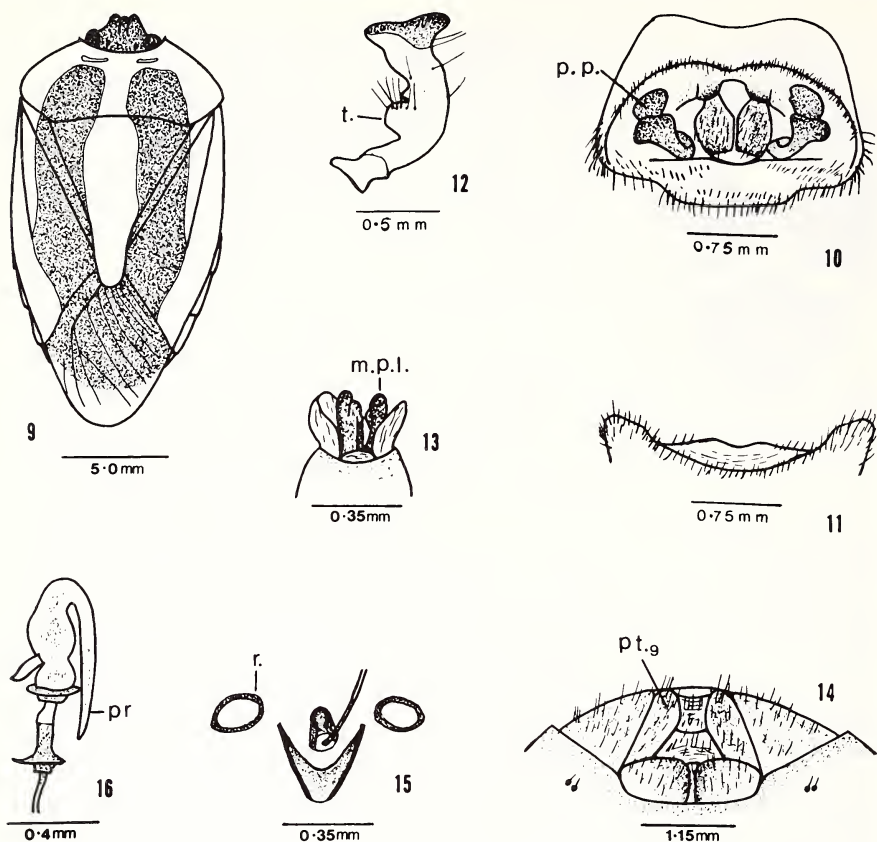


Figs. 1–8. *A. spectabilis*. 1. Dorsal view. 2. Pygophore, dorsal view. 3. Ventral border of pygophore. 4. Right clasper, ental view. 5. Aedeagus, lateral view. 6. Aedeagus, dorsal view. 7. Female genitalia. 8. Spermathecal bulb. Conjunctival appendage (c.a.), first gonocoxa (1gx.), median penial lobe (m.p.l.), process (pr.), paratergite 9 (pt.9), superior ridge (s.r.), tubercle (t.), theca (th.).

dian penial lobes flattened disc-like. Ejaculatory duct lying entirely between median penial lobes, short heavily sclerotized, slightly sinuous.

Female genitalia. Paratergites 8 triangular; paratergites 9 elongate, spatula-like. 1st gonocoxae triangular meeting centrally. 2nd gonocoxae visible as a triangular section above 1st gonocoxae. Paratergites and gonocoxae covered with long fine setae. Entrance of spermathecal duct surrounded by a number of small sclerites and ring sclerites. Spermatheca, typically pentatomoid with large spermathecal reservoir and pump with distal and proximal flanges; one long process on bulb of pump.

Variations. The color of this species varies from pale cream to burnt sienna; ventrally most specimens have large oblong black spots on the thoracic pleura on



Figs. 9-16. *A. acroleuca*. 9. Dorsal view. 10. Pygophore, dorsal view. 11. Pygophore, ventral border. 12. Left clasper, ectal view. 13. Aedeagus, dorsal view. 14. Female genitalia. 15. Entrance of spermatheca. 16. Spermathecal bulb. Median penial lobe (m.p.l.), process (pr.), paratergite 9 (pt.9), ring sclerite (r.), tubercle (t.).

each side, but these vary in size and shape and some may be missing; the femora have the dark brown color extending a $\frac{1}{4}$ – $\frac{1}{2}$ way from distal end of segment.

Distribution. Colombia; Panama; Peru; Ecuador (Iquitos); Costa Rica; Brazil (Rio de Janeiro, Mato Grosso, Obidos, Manaus, Teffé); Venezuela; Bolivia; Guatemala; Guiana; French Guiana; Paraguay; Mexico.

Arocera acroleuca (Perty, 1833)

Figs. 9-16

Pentatoma acroleucum Perty, 1833:168, pl. 33.

Cimex acroleucus Burmeister, 1835:366.

Pentatoma aequinoxialis Westwood, 1837:33. (Synonymized by Distant, 1900b:823.)

Ooedosoma acroleucum Amyot and Serville, 1843:128.

Arocera acroleuca Stal, 1872:37; Kirkaldy, 1909:109; Piran, 1966:86.

Type. Holotype *Pentatoma acroleucum*, Zoologische Museum, Munich. Type seen.

Diagnosis. HEAD: Dorsally and ventrally black except bucculae sometimes yellow and extending from them a yellow band around base of head; bucculae distinctly raised along outer margins, with lateral striae. Eyes black. Ocelli amber. Antennae black, segments 3 and 4 flattened. Rostrum extending beyond metacoxae, yellow except for apex smoky brown. THORAX: Yellow with broad horseshoe shaped black mark, open anteriorly; black beginning on each side of pronotum basally, continuing caudad across lateral portion of scutellum at base and coria excepting costal margin into black membrane; anterolateral and anterior margins of pronotum, mesial stripe on pronotum and scutellum, costal margin of coria, all yellow. Ventral surface of thorax yellow. Legs. Coxae, trochanters yellow; basal half of femora yellow, apical half dark brown; tibiae and tarsi dark brown. ABDOMEN: Connexiva yellow; sterna yellow.

Male genitalia. Pygophore with ventral border biconcave on either side of a median rounded projection, a shallow emargination found centrally beneath border. Dorsal border broadly arched with a central collar forming a median emargination into which the apex of the proctiger sits when at rest. A small flattened oval pygophoral plate found one on each side laterally just adjacent to margin of border; apex of claspers lying on top of this plate when at rest. Proctiger oblong. Claspers C-shaped, apically broad, bi-lobed; basally with a small tubercle on inner dorsal margin; short setae on tubercle and longer ones on outer margin of clasper. Aedeagus. Theca cylindrical, moderately sclerotized; 1 pair membranous conjunctival appendages, small lobe-like. Median penial lobes small, spatulate, basally tapering; ejaculatory duct small, straight, completely enclosed by median penial lobes.

Female genitalia. External genitalia very similar to *A. elongata*. A number of small crescent shaped sclerites around ejaculatory duct opening (Fig. 15). Ring sclerites present. Spermatheca. Bulb with a long and short process.

Distribution. Brazil (Goiás, Encruzilhada; Vicosia; São Paulo; Teffe; Mato Grosso; Barroso; Diamantino); Peru; Colombia; Surinam; Bolivia; Ecuador; Guatemala; Panama; Guyana.

Arocera splendens (Blanchard, 1841)

Figs. 17–25

Pentatoma splendens Blanchard, 1841:148.

Pentatoma splendida Dallas, 1851:256.

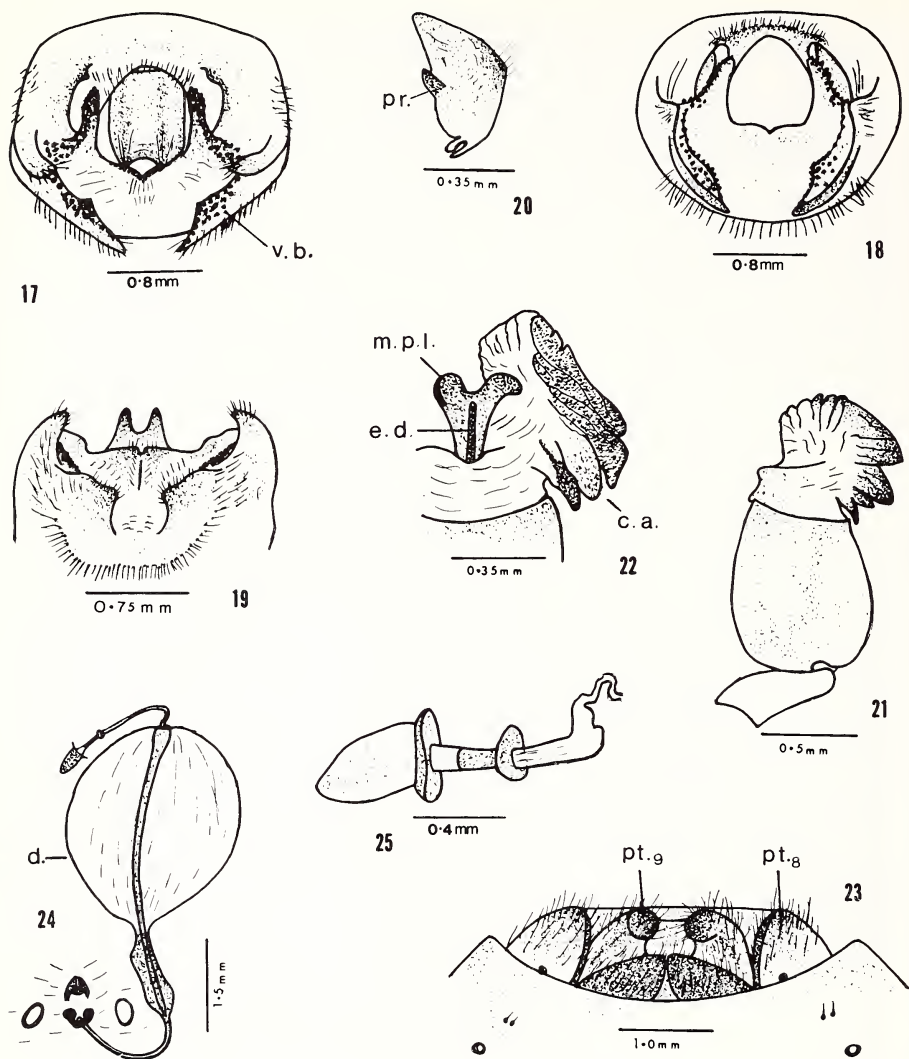
Pentatoma principalis Stal, 1855:182; 1856:58.

Arocera principalis Stal, 1862:107; Becker and Grazia-Vieira, 1971:12.

Arocera splendens Stal, 1872:38; Distant, 1880:pl. 7, figs. 13–17; Kirkaldy, 1909: 110; Becker and Grazia-Vieira, 1971:12.

Type. Type of *Pentatoma splendens* not located.

Diagnosis. HEAD: Dark metallic green or blue dorsally, reddish brown ventrally. Eyes dark brown. Ocelli reddish brown. Antennae fuscous, segments 2 and 3 flattened. Rostrum reaching hind coxae, dark brown. THORAX: Pronotum dark metallic green



Figs. 17-25. *A. splendens*. 17. Pygophore, dorsal view. 18. Pygophore, caudal view. 19. Pygophore, ventral border. 20. Right clasper, ental view. 21. Aedeagus, lateral view. 22. Aedeagus, ventral view. 23. Female genitalia. 24. Spermatheca. 25. Spermathecal bulb. Conjunctival appendage (c.a.), dilation (d.), ejaculatory duct (e.d.), median penial lobe (m.p.l.), process (pr.), paratergite 8 (pt.8), paratergite 9 (pt.9), ventral margin (v.b.).

with anterior and anterolateral margins outlined in red; scutellum dark metallic green. Hemelytra, dark metallic green, coria with costal margin red basally. Pleura and sterna red suffused with brown. Legs. Coxae reddish pink; trochanters basally red darkening to brown apically; femora brown; tibiae and tarsi dark brown. ABDOMEN:

Connexiva alternated red and dark brown; sterna red suffused with brown, lateral margins of segments 3–7 with a bright red oblong spot.

Male genitalia. Pygophore with ventral margin divided into two sections, upper margin consisting of two stout arms, one on each side projecting across the lateral margins of the pygophoral opening; these arms covered on their apices and outer margins with a series of small tubercles. Lower margin developed into two flat plates meeting centrally in a deep U-shaped median emargination, between these plates lies the inferior ridge which is broadly U-shaped with a small median notch forming the ventral border to genital opening. Inner margins of lower plates covered with small heavily sclerotized tubercles bearing fine setae. Dorsal margin broadly arched, forming a small blunt horn-like process at its junction with ventral margin on each side. Proctiger tube-like, distal margin produced into two upturned horns. Claspers small, triangular, bearing a small thumb-like process half way along outer margin and numerous fine setae on margins. Aedeagus. Theca small, weakly sclerotized. Conjunctival appendages large, basally membranous, apically divided into 4 finger-like lobes, apical two broader and larger than basal two, all lobes moderately sclerotized, upper 3 lobes covered in small fine teeth. Median penial lobes sclerotized and completely enclosed by conjunctival appendages, basally fused into a solid stem, apically divided into two bluntly rounded curved flattened arms. Ejaculatory duct a small sclerotized straight tube lying within median penial lobes.

Female genitalia. Externally similar to *A. elongata*, however 8th paratergites with a vertical side on inner surface forming a concavity; 9th paratergites deeply impressed centrally forming the anterior wall of concavity; 1st gonocoxae ovoid, with a posterior fringe of hairs; 2nd gonocoxae fused and lying vertically at right angles to 1st gonocoxae, facing posteriorly. Ring sclerites and small accessory sclerites present round entrance to spermathecal duct. Spermatheca. Reservoir apically spherical with a short sclerotized sausage-like base. Pump with distal and proximal flanges; bulb simple, dome-like.

Variations. Color varies from light metallic green to metallic blue or dark brown with a slight metallic green sheen dorsally. Anterior margins of pronotum ventrally outlined in yellow brown. Abdominal sterna may be dark brown or yellow brown, sometimes with 3 patches of red or yellow brown centrally on each segment; lateral spots may be yellow brown.

Distribution. El Salvador; Mexico; Guatemala; Ecuador; Colombia; Venezuela; Panama; British Honduras; Tobago; Jamaica; Peru.

Arocera nigrorubra (Dallas, 1851)

Figs. 26–36

Strachia nigrorubra Dallas, 1851:267.

Strachia quadripunctata Signoret, 1851:337, pl. 10.

Arocera nigrorubra Stal, 1872:38; Kirkaldy, 1909:109; Rolston, 1976:3.

Arocera affinis Distant, 1880:74, pl. 7; Kirkaldy, 1909:109; Rolston, 1976:3. **New**

Synonymy.

Arocera altivola Distant, 1890:337, pl. 31; Kirkaldy, 1909:109; Rolston, 1976:3. **New**

Synonymy.

28



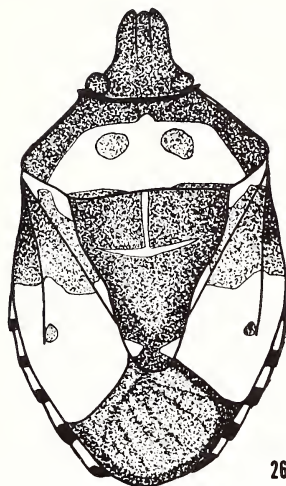
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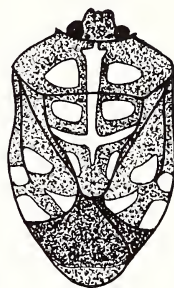
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26



3.0 mm

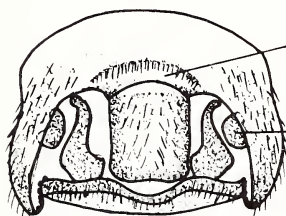
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5.0 mm

s. r.

t.



0.55 mm

30

31



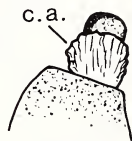
0.6 mm

32



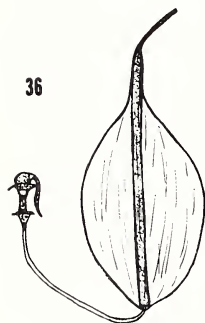
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33



0.35 mm

36



1.4 mm

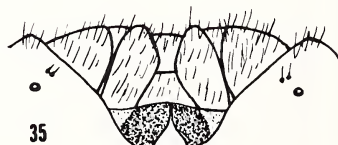
34

m. p. l.



0.35 mm

35



0.9 mm

Arocera chiriquensis Distant, 1890:337, pl. 30; Kirkaldy, 1909:109; Becker and Grazia-Vieira, 1971:11; Rolston, 1976:3. **New Synonymy.**

Arocera contralineata Piran, 1955:82; Becker and Grazia-Vieira, 1971:11. **New Synonymy.**

Strachia placens Walker, 1867:316.

Arocera placens Distant, 1900:391; Kirkaldy, 1909:110; Rolston, 1976:3. **New Synonymy.**

Arocera protea Distant, 1880:73, pl. 7; Kirkaldy, 1909:110; Rolston, 1976:3. **New Synonymy.**

Types. Holotype *Strachia nigrorubra* Dallas ♂, British Museum (Nat. Hist.). Type seen. The following types in the British Museum (Nat. Hist.) were also examined: *Arocera affinis* Distant ♀; *Arocera altivola* Distant ♂; *Arocera chiriquensis* Distant ♂; *Strachia placens* Walker ♂. The holotype of *Arocera contralineata* Piran could not be obtained, however a paratype in the collection of the University Nacional de la Plata was examined.

Comment. This proved to be an exceedingly difficult species to define. It consists of a maze of color patterns which actually integrate with *A. spectabilis*. There are, however, overall differences between these insects and their congeners in size and in the male genitalia to warrant retaining species status for these forms. I suspect many of the color patterns are local populations and a great deal of ecological work needs to be done on this species to determine the limits of each color morph.

Diagnosis. HEAD: Dorsally and ventrally black; jugae swollen apically and raised. Eyes brown. Ocelli red. Antennae black, segments 2, 3 and 4 flattened. Rostrum black, apex exceeding hind coxae. THORAX: Pronotum with a broad black margin around outer margins, central portion bright red with two black spots. Scutellum black with two red spots one on each side near apex; elytra bright red with broad black bands proximad, two small black spots in centre of distal red portion. Pleura, sterna and legs black. ABDOMEN: Connexiva alternated red and black; sterna red with a central broad black band and small black spots surrounding each spiracle; further oblong black spots found in the disto-lateral corner of each segment.

Male genitalia. Pygophore with ventral margin almost straight with a shallow median emargination, a triangular depressed area found below margin giving the appearance of a vertical wall when pygophore is in situ. Fine setae on margins and surface of pygophore. Dorsal margin with a superior ridge and a pair of small oval well sclerotized tubercles, one on each side, lying beneath the border. Claspers L-shaped, apex produced into a finger-like process, basally flattened and curved up, bearing a tuft of long setae, fine setae and serrations on outer margin. Proctiger box-like, bearing numerous fine setae. Aedeagus similar to *A. spectabilis*.

Female genitalia. Similar to *A. spectabilis*, paratergites 9 somewhat more slender; 1st gonocoxae with inner margins sinuate (generally straight in *A. spectabilis*). Spermatheca similar to *A. spectabilis*.

← Figs. 26–36. *A. nigrorubra*. 26–29. Dorsal view showing color patterns. 30. Pygophore, dorsal view. 31. Pygophore, ventral border. 32. Right clasper, ental view. 33. Aedeagus, lateral view. 34. Aedeagus, ventral view. 35. Female genitalia. 36. Spermatheca. Conjunctival appendage (c.a.), median penial lobe (m.p.l.), superior ridge (s.r.), tubercle (t.).

Variations. There are several color patterns, the basic type of each will be described although various integrades between each can readily be found.

1. Color pattern basically similar to that of *A. spectabilis*, color background may vary from bright yellow to deep orange; head bicolored above and below, pattern variable.

2. Prothorax with a broad orange T-shaped mark; scutellum with an orange cross; distal portion of elytra with irregular orange macula. Abdominal sterna may lack central maculae except on 7 (Fig. 28).

3. Prothorax and scutellum with a large cross outlined in brown; areas on each side of cross orange or brown margining into dark brown across top of prothorax; hemelytra with more orange or reddish orange areas. Abdominal sterna with small central maculae and no maculae around spiracles. Some specimens have only a broad brown band along the distal margin of each sternum (Fig. 27).

4. As above but intervening dark brown or black, leaving cross in yellow or red, apical portion of cross swollen. Abdominal sterna without maculae around spiracles (Fig. 29).

5. Dorsum uniformly yellow to red excepting black on part or all of head, anterior margin of pronotum and small macula on disk of costal margin of coria.

Distribution. Peru; Mexico; Ecuador; Brazil (Rio de Janeiro, Bahia, Mato Grosso, Obidos, Manaus, Teffe); Colombia; Cuba; Guatemala; Paraguay; Argentina; Panama; Haiti; Jamaica; St. Lucia; Trinidad.

Arocera rufifrons (Dallas, 1851)

Figs. 37-43

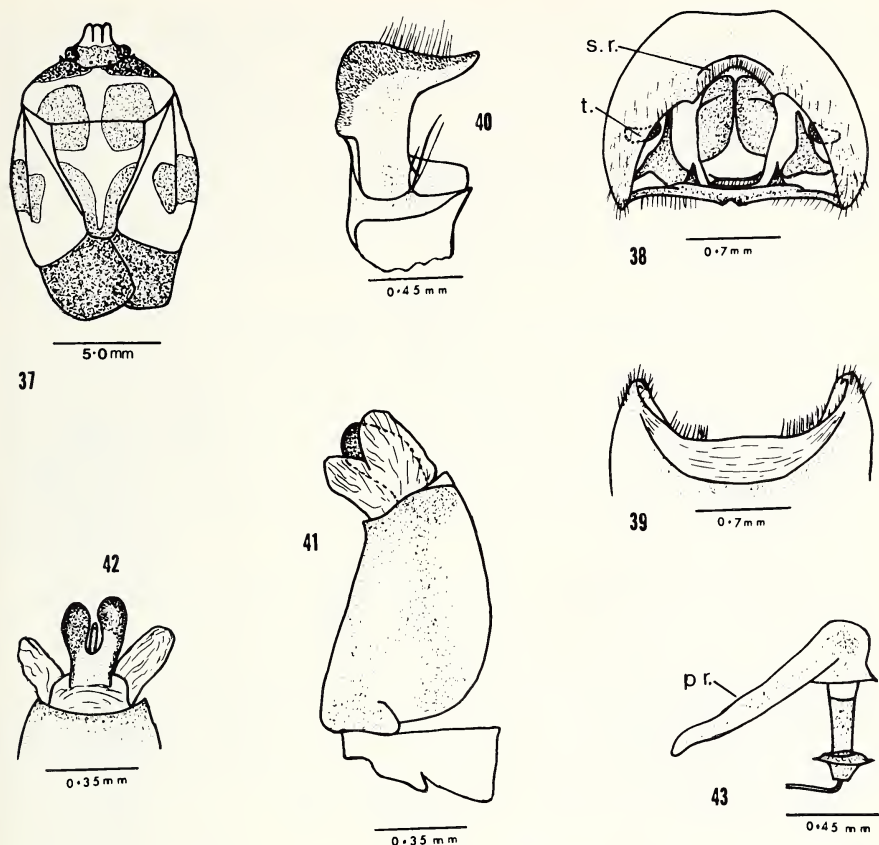
Strachia rufifrons Dallas, 1851:267.

Arocera rufifrons Stal, 1872:38; Kirkaldy, 1909:110; Rolston, 1976:3.

Type. Two syntypes, both ♀, British Museum (Nat. Hist.). Types seen. I select the specimen with the label 85a as LECTOTYPE, the other specimen labelled 85b, is the PARALECTOTYPE.

Diagnosis. HEAD: Dorsally, apical $\frac{2}{3}$ scarlet, basal $\frac{1}{3}$ dark brown, ventrally scarlet. Jugae raised along outer margins with a series of diagonal striae (sometimes absent); margins of jugae continued inwards to form a short ridge in front of each eye. Eyes brown. Ocelli amber. Antennal segment 1 red, 2-5 dark brown; 2-4 flattened. Rostrum extending well beyond mid coxae, segment 1 red, 2-4 brunneous. THORAX: Pronotum scarlet with black maculae in anterior angles; and two oblong black patches in center of pronotum extending onto scutellum forming 2 large oblong maculae. Scutellum scarlet with two further black maculae extending midway to near apex—these merge with maculae on the hemelytra to form 2 bands separated centrally across the mid portion of the species. Pleura mottled reddish brown. Legs. Coxae, trochanters brunneous; remaining segments mid-brown. ABDOMEN: Connexiva and sterna scarlet, with paired black spots on each side laterally on segments 3-6.

Male genitalia. Similar to *A. spectabilis*. Pygophore with ventral margin straight, impressed below margin forming a vertical wall when pygophore in situ. Superior ridge not as well defined as in *A. spectabilis* tubercles mainly concealed below dorsal margin. Claspers, L-shaped with finger-like process apically; upper margin smoother



Figs. 37–43. *A. rufifrons*. 37. Dorsal view. 38. Pygophore, dorsal view. 39. Pygophore, ventral border. 40. Right clasper, ectal view. 41. Aedeagus, lateral view. 42. Aedeagus, dorsal view. 43. Spermathecal bulb. Process (pr.), superior ridge (s.r.), tubercle (t.).

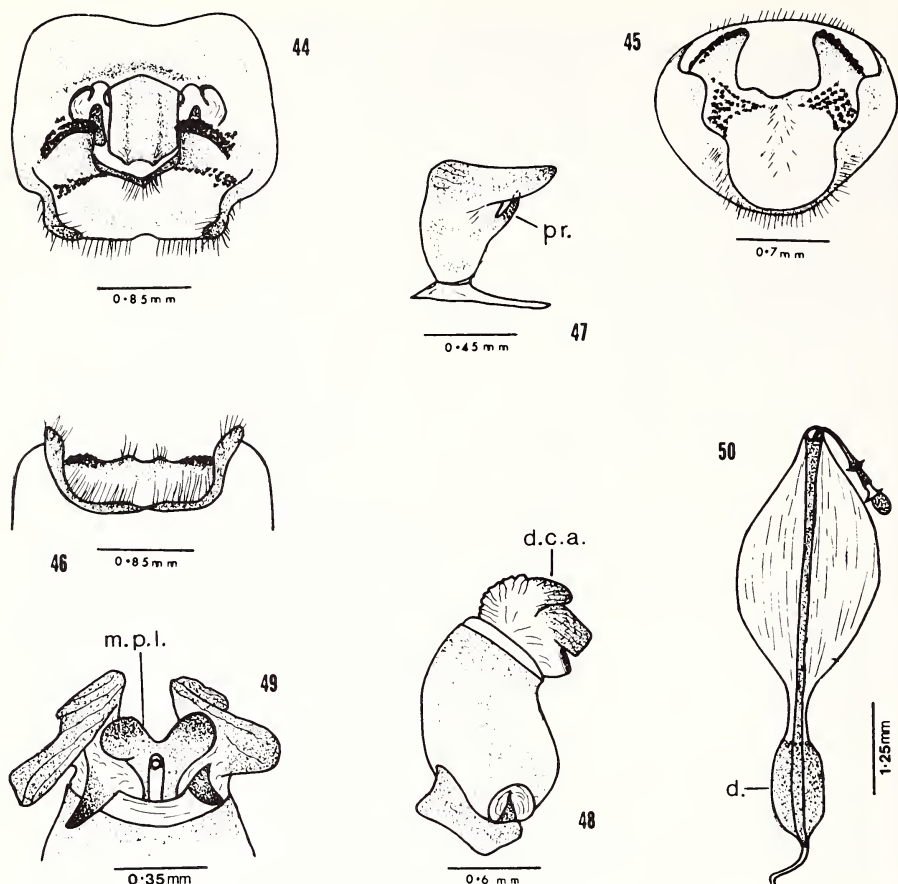
than in *A. spectabilis*. Aedeagus similar to *A. spectabilis*, median penial lobes more rounded and club-like.

Female genitalia. External genitalia similar to *A. spectabilis*. Spermathecal bulb with one process.

Variations. Background color may be orange or yellow brown. The proportion of reddish and brownish color on head is variable. Some specimens have no maculae on the abdominal sterna but spots at lateral margins; others have a large central spot as well as lateral maculae. The color of the dorsal maculae can vary from black to faded smoky-brown.

Distribution. Colombia; Peru; Belize; Mexico; Brazil.

Note. This species is very close to *A. spectabilis* and may with further biological information prove to be only a color variant of that species.



Figs. 44-50. *A. rufonotata*. 44. Pygophore, dorsal view. 45. Pygophore, caudal view. 46. Pygophore, ventral border. 47. Right clasper, ectal view. 48. Aedeagus, lateral view. 49. Aedeagus, ventral view. 50. Spermatheca. Dilation (d.), dorsal lobe of conjunctival appendage (d.c.a.), median penial lobe (m.p.l.), process (pr.).

Arocera rufonotata Stal, 1861

Figs. 44-50

Arocera rufonotata Stal, 1861:140; Distant, 1880:pl. 7; Kirkaldy, 1909:110.

Type. Holotype. Naturhistoriska Riksmuseet, Stockholm. Type seen.

Diagnosis. HEAD: Very dark metallic green dorsally, centrally dark brown with patches of red on either side of bucculae. Jugae slightly raised apically with distinct diagonal striae. Eyes brown. Ocelli amber. Antennae black, segments 2 and 3 flattened. Rostrum reaching to or slightly past metacoxae, dark brown. THORAX: Prothorax dark metallic green with red spots at anterior angles and lateral angles and

one red spot centrally. Scutellum dark metallic green with an elongate red spot in lateral angles. Hemelytra dark metallic green with an elongate red spot centrally at distal margin of corium. Ventral surface of thorax black with red spots at anterior and lateral angles of prothorax; base of proepisternum and proepimeron red; mesepisternum above metacoxae, red. Metepisternum with red patch above metacoxae extending below evaporative area to posterior and lateral margins of segment. ABDOMEN: Connexiva alternated red and black, sterna black with red oblong spots at lateral margins of segments 3–7 and a further two large red spots, one on either side of the mid line on segments 3–6, widely separate on 3, less widely separated on 6.

Male genitalia. Pygophore very similar to *A. rufolimbata*, shape of inferior ridge somewhat different, deeper and without central notch. Clasper similar to *A. rufolimbata*, finger-like process longer, narrower; apex of clasper less acute than in *A. rufolimbata*. Aedeagus. Conjunctival appendages tri-lobed; dorsal lobe bluntly rounded, sclerotized; middle lobe oblong, sclerotized and with minute spines over entire surface; lower lobe acute, heavily sclerotized on upper surface; base of appendages membranous. Median penial lobes fused basally, apically developed into two broad rounded lobes, heavily sclerotized. Ejaculatory duct short, straight, enclosed by median penial lobes.

Female genitalia. External genitalia similar to *A. splendens*. Spermatheca similar to *A. splendens*, dilation with small thickened base somewhat differently shaped from that of *A. splendens*.

Variations. Some specimens appear almost metallic dark brown and the dorsal spots may be orange-brown; ventral surface may be orange-brown with no spotting on the abdominal sterna. In other specimens the ventral surface is brown, the two central spots of the abdomen become diffuse, giving the abdomen a mottled brown and red appearance. Some specimens have 2 central red spots on abdominal sternum 7.

Distribution. Mexico.

Arocera rufolimbata Stal, 1872

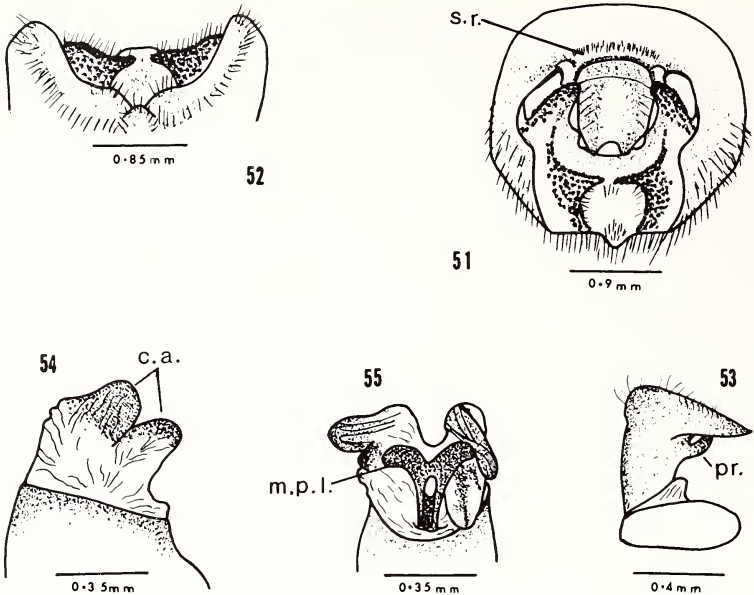
Figs. 51–55

Arocera rufolimbata Stal, 1872:38; Kirkaldy, 1909:110; Monte, 1945:269; Grazia, 1977:163.

Type. Holotype. Naturhistoriska Riksmuseet, Stockholm. Type seen.

Diagnosis. HEAD: Dorsally greenish black overlaid with a metallic green sheen, ventrally buff; jugal margins raised anteriorly, diagonal striae on jugae and tylus. Eyes and ocelli brown. Antennae black, segments 2–4 flattened. Rostrum slightly surpassing metacoxae; segment 1 buff, 3–4 dark brown. THORAX: Pronotum dark greenish-black with slight metallic sheen; a yellow stripe running right round outer margin of pronotum and extending down outer margins of elytra for $\frac{1}{3}$ their length. Scutellum and elytra same color as pronotum. Pleura and sterna testaceous. Legs. Coxae, trochanters, femora testaceous; tibiae and tarsi dark brown. ABDOMEN: Connexiva testaceous; sterna yellow.

Male genitalia. Pygophore similar in some respects to *A. colombiana*. Ventral



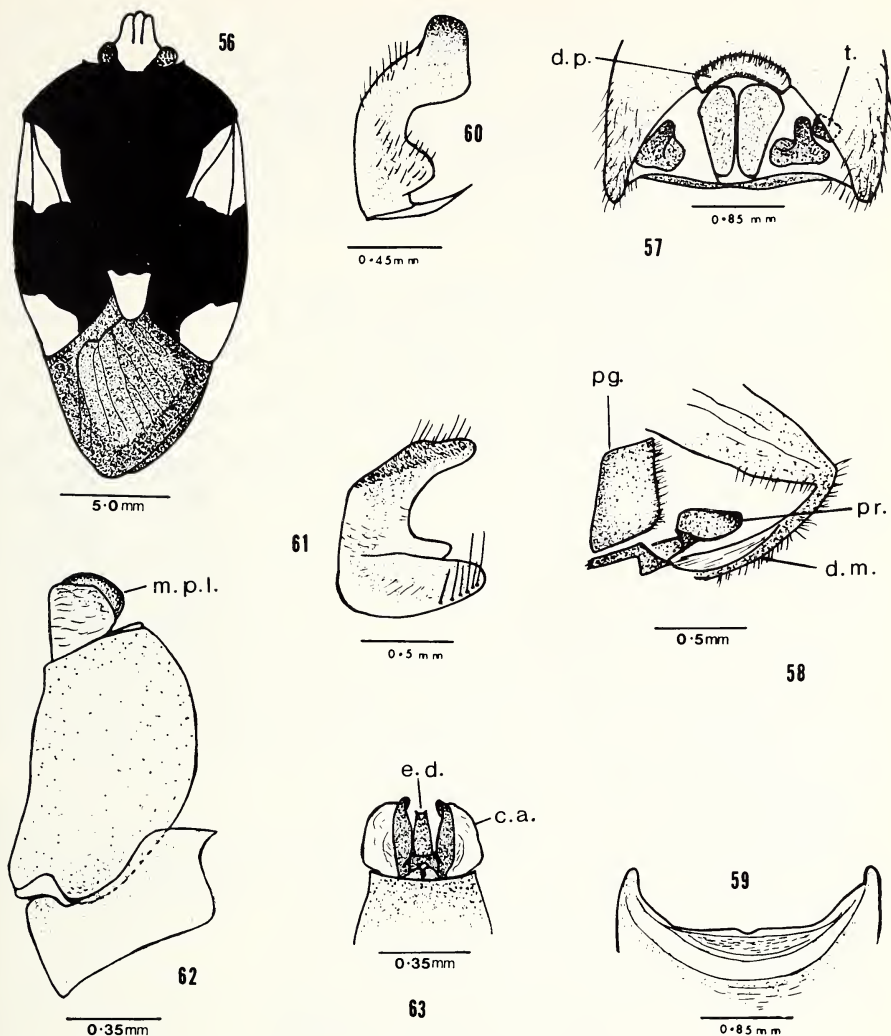
Figs. 51–55. *A. rufolimbata*. 51. Pygophore, dorsal view. 52. Pygophore, ventral border. 53. Left clasper, ectal view. 54. Aedeagus, lateral view. 55. Aedeagus, ventral view. Conjunctival appendage (c.a.), median penial lobe (m.p.l.), process (pr.), superior ridge (s.r.).

margin developed into two large horn-like processes, one on each side, laterally covered with small heavily sclerotized tubercles; centre of margin deeply emarginate and crenulated. Inferior ridge shallow forming a flattened and somewhat depressed area below ventral margin, bearing two distinct patches of tubercles one on each side produced into two acute ridges centrally and separated by a short gap. Dorsal margin with a deep oval depression one on either side of a narrow superior ridge. Numerous long stout setae found on margins of pygophore. Proctiger box-like well sclerotized, caudally expanded into two blunt projections. Claspers L-shaped, apically acute and with a distinct thumb-like process near apex of stem. Aedeagus. Theca short sausage-like. One pair of conjunctival appendages divided into two lobes, upper lobe oblong sclerotized and covered with fine spines; lower lobe bluntly rounded, sclerotized apically; basically both appendages membranous. Median penial lobes Y-shaped, basally fused, apically curved and cylindrical. Ejaculatory duct short, tubular and sclerotized.

Female genitalia. Similar to *A. splendens*. Spermatheca also similar.

Variations. Some specimens may be dorsally distinctly reddish brown with abdominal sterna black with 3 red spots centrally on segments 3–6; and 2 centrally on 7; lateral margins of segments 2–7 with broad red maculae. The abdominal sterna of other specimens may be patterned in the same way with yellow or orange. Reductions of this pattern are also found.

Distribution. Colombia; Venezuela; Brazil.



Figs. 56–63. *A. elongata*. 56. Dorsal view. 57. Pygophore, dorsal view. 58. Pygophore, dorsal view, right clasper removed. 59. Pygophore, ventral border. 60. Right clasper, ectal view. 61. Right clasper, ventral view. 62. Aedeagus, lateral view. 63. Aedeagus, dorsal view. Conjunctival appendage (c.a.), dorsal margin (d.m.), depression (dp.), ejaculatory duct (e.d.), median penial lobe (m.p.l.), proctiger (pg.), process (pr.), tubercle (t.).

Arocera elongata Showalter, 1929

Figs. 56-66

Arocera elongata Showalter, 1929:33, pl. V, and p. 40; Van Duzee, 1937:25-27; Piran, 1962:5; Becker and Grazia-Vieira, 1971:11; Sabrosky, 1972:87-88.

Arocera repleta Van Duzee, 1931:94. **New Synonymy.**

Types. Lectotype No. 52107, U.S. National Museum (designated Sabrosky, 1972). Type seen. The holotype of *Arocera repleta* Van Duzee, California Academy of Sciences has also been examined.

Diagnosis. HEAD: Bright orange-red dorsally except for two triangular black patches running across ocelli, ventrally orange-red; jugae slightly swollen apically and re-curved; diagonal striae near base. Antennae. Segment 1 orange, 2-5 black, segments 2-4 flattened. Rostrum projecting well beyond hind coxae; segment 1 orange, 2-5 black. THORAX: Pronotum black; scutellum black with orange-red tip; hemelytra with orange maculae at base and apical corners of corium; black in between; membrane black; pleura black except for an orange band at lateral margin, sterna black; legs black. ABDOMEN: Connexiva red; sterna orange with a black band at tip of abdomen, covering segment 7 and small sections of 6.

Male genitalia. Pygophore with ental margin widely excavated forming two blunt prominences one at each outer corner. Dorsal border deeply excavated bearing centrally a crescent-shaped depression. Proctiger oblong, swollen basally, divided into two plates down centre. Pygophore and proctiger bearing numerous fine setae. Inner dorsal margin of cup bearing a small rounded club-like process one on each side. Claspers L-shaped with broad base, bearing a number of setae on outer margin. Aedeagus similar to *A. spectabilis*. Median penial lobes broadly hook-shaped, flattened, sclerotized on outer dorsal margins, basally fused by a short cross bar.

Female genitalia. Similar to *A. spectabilis*.

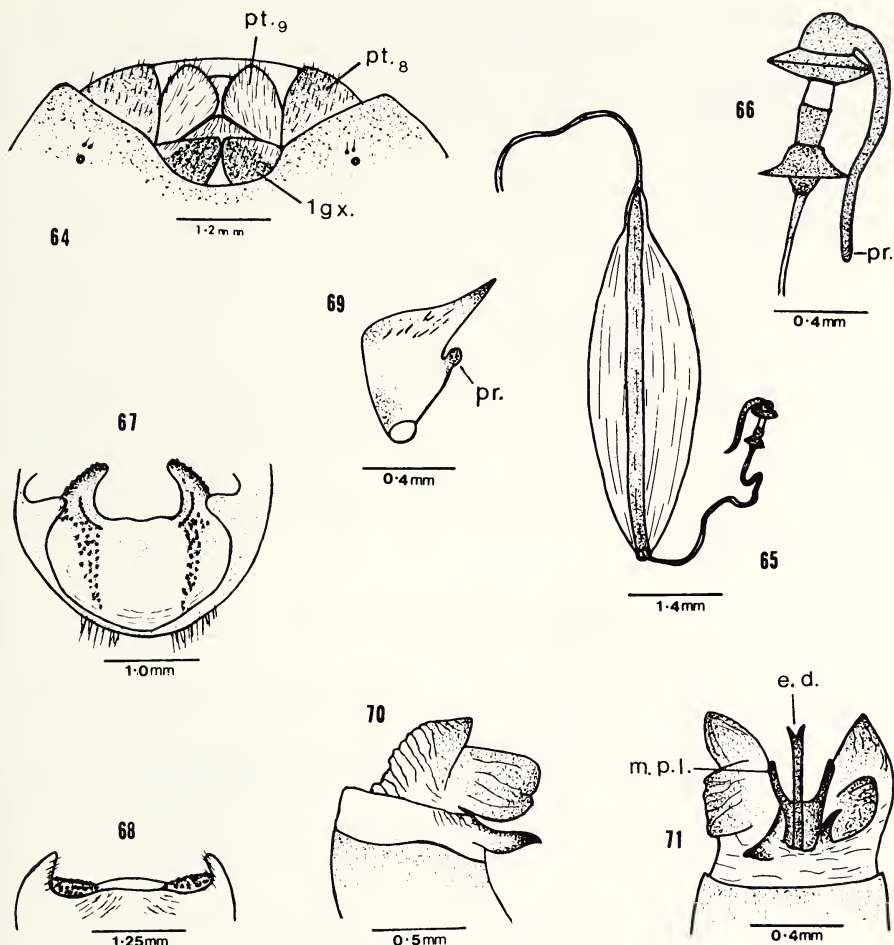
Variations. Small black spots may be found on lateral margins of abdominal segments 3-5. A distinct color variety exists which is dorsally bright orange-red or orange-brown; some specimens have varying degrees of black forming maculae on the prothorax/scutellum and black spots on hemelytra.

Distribution. Panama; Ecuador; Peru; Venezuela; Bolivia; Colombia. The bright orange-red variety appears to be restricted to Panama.

Acrocera verdana, new species

Figs. 67-71

Description. HEAD: Dorsally metallic green, ventrally dark brown suffused with red. Jugae only slightly raised anteriorly with numerous diagonal striae. Eyes black. Ocelli amber. Antennae black, segments 2 and 3 flattened. Rostrum extending to hind coxae, black. THORAX: Pronotum metallic blue-green with a broad brick-red band running right around outer margin from lateral angles, this band extends down along the outer margins of the hemelytra. Scutellum and remainder of hemelytra metallic blue-green with an irregular brick-red broad stripe running centrally from base of scutellum to the tip. Membrane metallic blue-green. Pleura iridescent black with a broad brick-red band running along outer margins of propleura down the lateral margins of the meso- and metapleura and along basal margin of metapleuron.



Figs. 64–71. 64–66. *A. elongata*. 64. Female genitalia. 65. Spermatheca. 66. Spermathecal bulb. 67–71. *A. verdana*. 67. Pygophore, caudal view. 68. Pygophore, ventral border. 69. Right clasper, ectal view. 70. Aedeagus, lateral view. 71. Aedeagus, dorsal view. Ejaculatory duct (e.d.), 1st gonocoxa (1gx.), process (pr.), paratergite 8 (pt.8), paratergite 9 (pt.9).

Legs dark reddish brown. ABDOMEN: Connexiva brick-red, sterna iridescent black with a broad brick-red band along lateral margins of abdomen.

Male genitalia. Pygophore similar in many respects to *A. rufonotata*. Inferior ridge not as deeply excavated and forming a shallower depression behind ventral margin. A series of small tubercles running from large peg-like structures on lateral margin inside this depression, position of these tubercles is different from those found in *A. splendens* and *A. rufonotata*. Clasper very acutely pointed with a short thumb-like process. Aedeagus. Conjunctival appendages tri-lobed as in *A. rufonotata*, ventral

most appendages heavily sclerotized, more acute than in *A. rufonotata*. Median penial lobes, slender arms fused to a broad base forming a Y; ejaculatory duct long, straight, extending well beyond median penial lobes (unlike any other related species).

Female genitalia. External genitalia similar to *A. splendens*, spermatheca similar to *A. rufonotata*.

Holotype. ♂, labeled Panama: Chiriqui Pr., 3 km W. Cerro Punta, 80°51'N, 82°36'W, 8-VI-77. Deposited in U.S. National Museum. Type No. 100413.

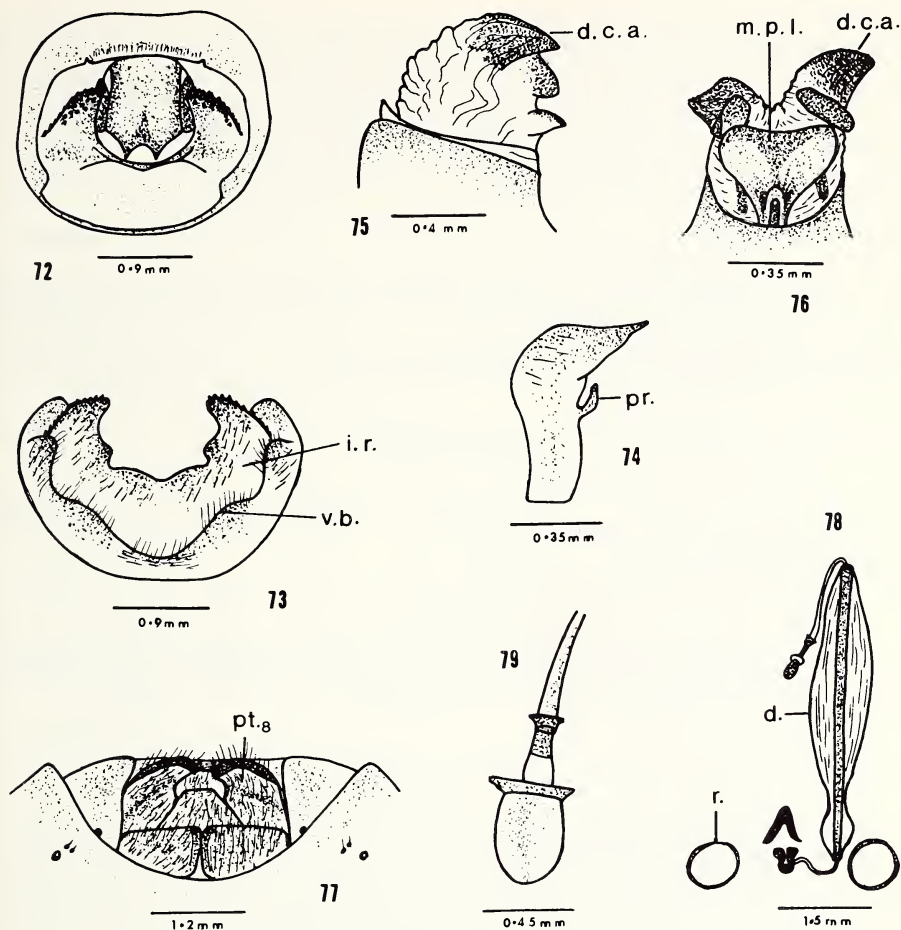
Paratypes. PANAMA: ♀, Chiriqui Dist., Renacimiento, Sta. Clara, 17-V-77, R. Hartman; ♀, same data, except July 5, 1977; ♀, same data, except 16-20-VI-77; ♂, same data, except 4-VII-77; ♀, same data, except 17-V-77; 2♂♂, same data, except 5-VII-77; ♀, Chirique, Boquette, 1,250 m, 8°48'N, 82°26'W, 14-X-1976, H. Wolda; ♀, same data, except 26-V-1977; ♀, Chirique Dist., Renacimiento, Oeste Clara, 5500', 16-20 Feb. '77, lights, A. & E. Thurman; 2♀♀, Chiriqui Dist., Renacimiento, 5500', 18-22-V-77, at lights, Engleman and Matos; ♀, Chiriqui Pr., 3 km W. Cerro Punta, 8°51'N, 82°36'W, 1,700 m, 8-VI-77 [In H. Dodge Engleman collection]. COSTA RICA: ♀, Guanacaste, V.17.1932, A. Alfaro, J. C. Butz Collection, 1961; ♀, Juna Vimas, Collection Wm. Schausz [In U.S.N.M.]. PANAMA: ♂, Barriles, Chiriqui, 1-31-31, M. E. McLellan; ♀, vicinity Boqueta, VIII-39, J. R. Slevin [In California Academy of Sciences].

Arocera colombiana, new species

Figs. 72-79

Description. HEAD: Dorsally black with a slight metallic green sheen; ventrally dark brown suffused with cream centrally; jugae with lateral angles slightly turned up with horizontal striae. Eyes, ocelli brown. Antennae dark brown; segments 2, 3 and 4 flattened. Rostrum extending to hind coxae, first segment brown suffused with yellow, segments 2-4 brown. THORAX: Pronotum anterior portion with a broad yellow band extending along lateral margins, remainder black with a central brown patch. Scutellum with a central brown patch surrounded by black. Hemelytra with a yellow streak on costal margins of coria extending about 1/3 way along, remainder black surrounding a central triangular patch of brown. Propleura dark brown with anterior margins yellow; meso- and metapleura dark brown. Legs chocolate brown. ABDOMEN: Connexiva alternated yellow and brown; sterna chocolate brown with 4 large yellow spots one on each lateral margin and two on either side of mid line; widely separate on segment 3, closer together on 7.

Male genitalia. Pygophore with ventral margin deeply excavated and bearing a well developed inferior ridge forming an inner vertical wall facing caudad. Central margin of inferior ridge deeply excised, laterally on each side developed into a stout well sclerotized horn covered with tubercles and short setae. Dorsal margin broadly arched bearing medianly a narrow ill-defined superior ridge. Patches of long setae on margins of pygophore and on face of inferior ridge. Proctiger well sclerotized box-like, caudal margin produced into two short acute tails. Claspers small triangular with a finger-like process on the inner margins; claspers firmly embedded into wall of pygophore. Aedeagus. Theca small squat. Conjunctival appendages tri-lobed, lobes apically bluntly pointed, upper and middle lobes covered with small spines, lower lobes sclerotized on inner surfaces. Sclerotized median penial lobes fused into a flattened collar-like



Figs. 72–79. *A. colombiana*. 72. Pygophore, dorsal view. 73. Pygophore, ventral border. 74. Right clasper, ectal view. 75. Aedeagus, lateral view. 76. Aedeagus, ventral view. 77. Female genitalia. 78. Spermatheca. 79. Spermathecal bulb. Dilation (d.), dorsal lobe of conjunctival appendage (d.c.a.), inferior ridge (i.r.), median penial lobe (m.p.l.), process (pr.), paratergite 9 (pt.9), ring sclerite (r.), ventral margin (v.b.).

structure surrounding base of ejaculatory duct, latter a short tube moderately sclerotized.

Female genitalia. Paratergites 8 triangular. Paratergites 9 hook-shaped, deeply impressed centrally giving the paratergite a twisted appearance. Swollen apically and covered with long stout setae. 1st gonocoxae oblong heavily sclerotized, covered with stout setae. 2nd gonocoxae fused into a trapezoid plate lying vertically above 1st gonocoxae. Ring sclerites and accessory sclerites present internally. Spermatheca. Dilation swollen into a bulb basally; spermathecal pump without appendages.

Variations. Brown areas on pronotum scutellum and elytra may be extensive to the extent of eliminating most of the black areas leaving only a thin black line around scutellum and outer margins of elytra. Sterna may be completely orange-red with evaporative areas black. Spots on abdominal sterna may be red with black maculae centrally. Abdominal sterna may also be yellow with dark brown spots around spiracles and brown maculae centrally. Integrades between these types may also be found.

Holotype. ♂, labelled Venez. Deposited in the U.S. National Museum. Type No. 100414.

Paratypes. VENEZUELA: ♀, (a) Merida, (b) W. Robinson bequest 1929; ♀, H. Pittier; ♀, Rancho Grande Nr. Maracay, Ven. 8-V-1946. COLOMBIA: ♂, (a) Pres. by the Hono. Apolinar-Maria, (b) Fusagasuga, S. A. Rep. Col. 1915; ♀, same data; ♀, (a) Muzo, S. A. Colombia, (b) Pres. by Hono Apolinar-Maria. [All in U.S.N.M.].

Nomina dubia

Arocera fasciiventris Breddin, 1901

The type of this species could not be located. From Breddin's description it is probably synonymous with *A. spectabilis*.

Arocera capitata Breddin, 1901

The type of this species could not be located. From Breddin's descriptions this species is probably synonymous with *A. spectabilis*.

ACKNOWLEDGMENTS

I should like to thank the following people for the loan of material and type specimens. W. R. Dolling, British Museum (Natural History), London; C. A. Triplehorn, Ohio State University, Columbus; Paul H. Arnaud, Jr., California Academy of Sciences, San Francisco; Richard C. Froeschner, National Museum of Natural History, Washington, D.C.; Randall T. Schuh, American Museum of Natural History, New York; Luis de Santis, University Nacional de la Plata, La Plata; A. Kaltenbach, Naturhistorisches Museum, Wien; Per Lindskog, Naturhistoriska Riksmuseet, Stockholm; H. Dodge Engleman, Coco Solo, Panama Canal. I should also like to thank Professor L. H. Rolston who suggested this study and carried out much of the initial literature survey.

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Received November 30, 1982; accepted August 29, 1983.